Sociology and the Second Darwinian Revolution: A Metatheoretical Analysis*

Richard Machalek
University of Wyoming

Michael W. Martin
Adams State College

Sociologists tend to eschew biological explanations of human social behavior. Accordingly, when evolutionary biologists began to apply neo-Darwinian theory to the study of human social behavior, the reactions of sociologists typically ranged from indifference to overt hostility. Since the mid-1960s, however, neo-Darwinian evolutionary theory has stimulated a "second Darwinian revolution" in traditional social scientific conceptions of human nature and social behavior, even while most sociologists remain largely uninformed about neo-Darwinian theory and research. This article traces sociology's long-standing isolation from the life sciences, especially evolutionary biology, to divergence in the metatheoretical assumptions that typify conventional sociological thought versus contemporary evolutionary biology. We conclude with a discussion of the recent emergence of a nascent "evolutionary sociology" that integrates sociobiological reasoning with contemporary sociological thought.

> If we are programmed to be what we are, then these traits are ineluctable. We may, at best, channel them, but we cannot change them either by will, education, or culture. Stephen Jay Gould (Dennett 2003)

> If this is genetic determinism, then we can all breathe a sigh of relief: There are no genetic determinists. Daniel C. Dennett (Dennett 2003)

Between 1936 and 1947, a synthesis of ideas derived from Mendelian experimental genetics and Darwinian evolutionary theory consolidated the triumph of the Darwinian revolution in biology (Mayr 1982:566–70). This development came to be known in biology as the *evolutionary synthesis* or the *modern synthesis*, and the integration of Mendelian genetics and Darwinian theory now is called "neo-Darwinian" evolutionary theory. By the mid-1960s, the reach of neo-Darwinian reasoning had extended to include the study of the evolution of social behavior (Hamilton 1964; Trivers 1971; Williams 1966; Wilson 1975). When it expanded even further to include humans (Alexander 1979; Lumsden and Wilson 1981; Wilson 1975), neo-Darwinian theory ignited controversy by challenging the received wisdom in the social sciences about the possible influence of biology on human social behavior (Segerstråle 2000). Eventually,

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Direct correspondence to: Richard Machalek, Department of Sociology, University of Wyoming, Laramie, Wyoming 82071-3293. Email: Machalek@uwyo.edu.

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this new infusion of biological thinking into the social sciences came to be described as a "quiet revolution," as nothing less than a second Darwinian revolution (Wright 1994:4–7). Today, this revolution has gained footholds in several of the behavioral and social sciences including anthropology, psychology, the cognitive neurosciences, economics, political science, and psychiatry, and it has even established inroads into the humanities and arts.

The central (and most controversial) biological ideas about the evolution of social behavior come from the branch of population biology known as *sociobiology* (Wilson 1975), with additional contributions provided by the closely allied field of *behavioral ecology* (Dugatkin 2001; Krebs and Davies 1997). The recent application of neo-Darwinian reasoning to the study of human social behavior has spawned new, rapidly developing social science subdisciplines such as *Darwinian anthropology* (Symons 1989) and *evolutionary psychology* (e.g., Buss 1999; Palmer and Palmer 2002; Tooby and Cosmides 1989). Closer to home, a small but energetic community of scholars has given sociology representation in the new evolutionary social sciences under the banner of *evolutionary sociology* (see Lopreato 2001; Maryanski 1998). Among the first contemporary sociologists so engaged were Ivan Chase (1980), Lee Ellis (1977), Joseph Lopreato (1981, 1984), Pierre L. van den Berghe (1974, 1981; van den Berghe and Barash 1977), and Walter Wallace (1983). In all of these fields, theory and research are guided by principles derived directly from sociobiology and behavioral ecology, principles modified suitably for application to a culture-bearing species.

The recent incorporation of neo-Darwinian ideas into the social sciences signifies not merely the introduction of new variables into existing explanatory models or the deduction of novel hypotheses from orthodox theoretical perspectives; rather, it entails a reconsideration of the very foundations of conventional social science reasoning. Specifically, applying sociobiological and behavioral ecological theories to the study of human social behavior compels a reexamination, at the *metatheoretical* level, of social scientists' fundamental assumptions about human nature and human social organization. As a theory of the origin and transformation of species, Darwinism has triumphed even in the social sciences, thus inspiring one anthropologist to declare that "virtually all natural and social scientists are Darwinians now, and with good reason. I take that as read" (Kuper 1994:1). Only those social scientists who are creationists take exception to modern evolutionary explanations of the emergence and transformation of species. When, however, selectionist reasoning leads to the hypothesis that complex social behaviors derive from evolved, genetically encoded adaptations that are expressed in the design and functional properties of the brain and central nervous system and the endocrine system, sociological enthusiasm for Darwinism often wanes. In fact, most sociologists rarely concede that biology has much to offer their efforts to explain human social behavior beyond acknowledging that the brain endows humans with the "capacity for culture" via language and symbolic communication. Consequently, most sociological inquiry today proceeds apace absent any connection to biology, a circumstance analyzed and criticized by observers such as van den Berghe (1990) and Ellis (1996).

The primary purpose of this article is to identify the key metatheoretical assumptions about biology and human social behavior that typify contemporary sociological reasoning. We then compare these metatheoretical assumptions to those on which neo-Darwinian research and scholarship is based. Finally, we discuss how the metatheoretical assumptions prevalent in contemporary sociology are likely to influence the extent to which sociological inquiry may become aligned more closely with current developments in neo-Darwinian research.

SOCIOLOGY, BIOLOGY, AND HUMAN BEHAVIOR

The key elements of social science orthodoxy about biology and human behavior comprise, in encapsulated form, the *standard social science model*, or SSSM (Tooby and Cosmides 1992). Most contemporary sociologists will find the basic elements of the SSSM to be both familiar and unobjectionable: (1) human social behaviors are learned, not innate; (2) the biology of the brain shapes human social behavior only by endowing humans with the capacity for culture; (3) there is insufficient variation in the human genome to produce the full range of variation in social behaviors expressed within and among human societies; (4) culture, not biology, explains most variation in social behavior within and among human societies; and (5) emergent features of human societies are reducible neither to psychological nor to biological variables.[1]

Sociologists commonly embrace some variant of the SSSM because the only alternative they can envision is its logical antithesis, which we call the *exclusive genetic determinist model* (EGDM): (1) instinct, not learning, causes human social behavior; (2) genes program the human brain to express inalterable patterns of social behavior; (3) variation in patterns of human social behavior derives directly from variation in the human genome, and specific genes directly determine specific social behaviors; (4) biology, not culture, explains most variation within and among human societies; and (5) all features of human societies are reducible either to psychological or to biological variables. The genetic determinism featured in this model is said to be "exclusive determinism" because it reflects the view, common among sociologists, that since "the environment and culture determine human behavior . . . it follows that genes cannot" (van den Berghe 1990:178).

The pervasiveness of the SSSM in contemporary sociology is evident in college-level introductory sociology texts, which sociologists use widely in teaching their students, arguably sociologists' largest and perhaps most important audience. The introductory sociology text is the one venue in which sociologists routinely address questions about the relevance of biology to human behavior, and as such, it provides perhaps the best single opportunity to gauge the sentiments of sociologists on this topic. Although treatments of this topic in introductory texts are highly simplified, as is true of many other topics as well, the authors often express a degree of candor that is rare in advanced texts or in scholarly monographs written for more critical audiences. This makes sociologists' thoughts and sentiments about biology and human behavior particularly transparent and thus highly informative. As part of a larger project about sociological conceptions of society and human nature, we analyzed the 20 best-selling college-level introductory sociology texts sold in the United States during the spring and summer terms of 1997, 14 of which provided discussions of sociobiology (see the Appendix), the branch of evolutionary biology that applies neo-Darwinian explanatory principles to the study of social behavior.

Although the nature and quality of these textbook discussions of sociobiology vary somewhat, we found that their authors commonly fault sociobiology on four basic grounds: (1) its perceived ideological and political implications; (2) its putative failure to adduce evidence pertinent to its claims; (3) its "biological reductionism"; and (4) its "genetic determinism". The most prevalent criticism in these texts is that sociobiology's general explanatory approach is fatally flawed because it advocates biological reductionism and genetic determinism. The following synopsis, based on descriptions and criticisms of sociobiology reported in these texts, illustrates how sociobiology is often viewed in sociology.

[1] Adapted from Tooby and Cosmides (1992:24–31).

Although sociobiology has advanced our understanding of animal behavior, it has not provided comparable insights about human social behavior, nor is it likely to. And although biologically based explanations of human social behavior always are fraught with ideological danger, the primary deficiencies of human sociobiology are conceptual, theoretical, and empirical. For example, sociobiologists have adduced little if any evidence to prove that our genes determine any human social behavior. Instead, human social behavior is explained better in terms of culture and social learning, not instinct. The major limitation of the sociobiological perspective is that it entails biological reductionism in general and genetic determinism in particular. Both of these positions have been discredited effectively by well over a century's sociological scholarship and research. As has been well known by sociologists since Durkheim, human societies feature emergent properties, called "social facts," which are irreducible to the individual components that generate them. Accordingly, reductionism in any form has little to offer the explanation of human social behavior and societies. Thus, sociobiological explanations of human social behavior are flawed seriously, if not fatally, because they advocate genetic determinism. Genetic determinism makes sociobiology untenable for explaining human social behavior for a number of reasons, including the facts that it (1) neglects the role of the environment in shaping human behavior; (2) fails to account for the almost inestimable range of social and cultural forms exhibited by humans the world over; (3) neglects the role of learning in shaping human behavior; (4) misrepresents human behavior as fixed and inalterable due to the influence of genes; (5) misrepresents human behavior as directly determined by genes; (6) attributes specific behaviors to specific genes; and (7) fails to recognize that genes can only impose limits on human social behaviors, not prescribe them. In short, sociobiology naively misattributes to genes behaviors, which, in reality, are the product of inestimably complex interactions among the human mind, the sociocultural environment, and human experience. We cannot extrapolate from studies of animal social behavior to human social behavior. Endowed with powerful cognitive abilities and the capacity for symbolic communication and language, equipped with culture, and shaped by massive forces of history and social structure, humans largely are exempt from the more rudimentary biological forces that regulate the social behaviors of simpler, nonhuman social species.

To the extent that sociologists concur with the claims expressed in this synopsis, it is little surprise that they are impatient often with and are dismissive of efforts to "Darwinize" the social sciences. In their view, the versions of biological reductionism and genetic determinism they attribute to sociobiology yield an absurd conception of humans as little more than automatons propelled by the direct action of genes to exhibit rigid behaviors that are impervious to environmental influences, unmediated by consciousness, unreceptive to cultural guidance, and inalterable by social learning. Accordingly, any theoretical system that is indicted and convicted of such genetic determinism merits only enough attention to be discredited and summarily dismissed. And by labeling sociobiology as a perspective that not only tolerates but also actively promotes "exclusive" or "rigid" genetic determinism (van den Berghe 1990:178; Wilson 1998:166), sociologists can justify the cursory and superficial manner in which they are willing to deposit it into the dustbin of "bad ideas."

If sociobiological thinking were represented accurately by the previous synopsis, then the dismissive manner in which sociology textbook authors often treat sociobiology would be both understandable and justified. However, the target of criticism

in this synopsis is highly unlikely to be found anywhere in the research and scholarly literature being produced by contemporary sociobiologists. The type of thinking represented by the EGDM is no more acceptable to most contemporary evolutionary researchers and scholars than it is to SSSM thinkers in the behavioral and social sciences. In short, much of the criticism leveled against sociobiology appears to target a "straw man."

The ignorance of evolutionary biology exhibited by many sociological critics of sociobiology may be understandable, but it is not excusable. Over the past two decades, a number of evolutionary-minded sociologists have produced a body of work, informed and guided by sociobiological theory and research, that could have elevated levels of biological literacy in sociology to the point that misplaced criticisms of "biological reductionism" and "genetic determinism" could have been replaced by more productive dialogues about biology and human social behavior. For example, sociologists such as van den Berghe (e.g., 1981) and Lopreato (1981, 1984; Lopreato and Crippen 1999) have identified numerous research opportunities that await sociologists interested in participating in and contributing to the second Darwinian revolution.

Sociologists also fault sociobiology on the grounds that little or no empirical evidence exists to support its claims (Applebaum and Chambliss 1997; Bryjak and Soroka 1997; Doob 1997; Giddens 1996; Hess et al. 1996; Kornblum 1997; Macionis 1997; Popenoe 1995—see the Appendix for full citation information). Most notable in such discussions, however, is the absence of any reference whatsoever to the vast and rapidly growing body of empirical evidence, much of which is derived from controlled experiments, that has been generated by sociobiologists and is reported in a growing number of scientific and scholarly journals including *Evolution and Human Behavior* (formerly *Ethology and Sociobiology*), *Human Nature: An Interdisciplinary Biosocial Perspective, Behavioral and Brain Sciences, Politics and the Life Sciences, Behavioral Ecology and Sociobiology, Journal of Theoretical Biology, Animal Behavior, Trends in Ecology and Evolution, Nature, Science*, and others.

We contend that much of sociologists' disinterest in and antipathy toward sociobiology derives primarily from their *bioilliteracy*, especially in relation to genes and behavior.[2] Many of the objections to sociobiology raised by sociologists derive from apparent ignorance about genes and what they do (and do not do) in relation to behavior, including social behavior. Accordingly, a brief introduction to genetics and the ways in which genes can (and do) influence behavior is in order.

Although the study of genetics at either the molecular or population levels can be daunting, a growing number of scientists and science journalists (e.g., Avise 1998; Cartwright 2000; Durham 1991; Ridley 1999; Wills 1989) have provided high-quality, easily accessible explanations of elementary principles of genetics that make inexcusable the sorts of misrepresentations commonly found in sociological discourse. And for the more curious and suitably motivated reader, a growing body of texts on genes, evolution, and social behavior provides a set of more technical, but still highly accessible, resources (e.g., Alcock 2001; Barash 1982; Buss 1999; Hamilton 1996; Trivers 1985). Overall, one of the best and most readable among the popular science accounts remains Dawkins's *The Selfish Gene* (1989), the first edition of which has

[2] It can be argued that what Daly and Wilson (1988) call "biophobia" is likely to contribute to the bioilliteracy of sociologists. In turn, bioilliteracy is likely to reinforce biophobic tendencies. Both of these factors contribute to the failure of sociologists and other social scientists to come to terms with the neo-Darwinian challenge to the SSSM.

been available since 1976. A careful reading of Dawkins alone almost certainly could have inhibited critics from attributing to sociobiology the version of genetic determinism that routinely is castigated and feared by sociologists.

Briefly put, genes are segments of chromosomes made up of an extremely long, complex molecule (DNA). Basically, genes do three things: (1) replicate; (2) direct the synthesis of protein; and (3) regulate the activity of other genes. Genes specify and direct the self-assembly of an organism's phenotypic traits, including the structures and processes that constitute the *machinery* of behavior (primarily the brain and central nervous system and endocrine system), but genes themselves are not direct causes of behavior. Rather, genes influence behaviors in ways that are powerful but indirect (see Dawkins 1989:46–65). Genes prescribe the design properties of cells, tissues, organs, and organ systems as evidenced in their morphologies and physiologies, and it is by means of their influence on phenotypic *design* that genes can be said to influence behavior.

The process by means of which genetic information is expressed to yield a phenotype is called *epigenesis*, "the development of an organism under the joint influence of heredity and environment" (Wilson 1998:193). Gene-environment interaction results in the development of "epigenetic rules," which are "rules of thumb that allow organisms to find rapid solutions to problems encountered in the environment... Typically emotion driven, epigenetic rules in all categories of behavior direct the individual toward those relatively quick and accurate responses most likely to ensure survival and reproduction" (Wilson 1998:193). Epigenetic rules are evident, for example, in patterns of incest avoidance both in humans and other species (Wilson 1998:173–80). For Wilson (1998:165), human nature consists of an endowment of epigenetic rules that evolved in ancestral environments, and thus, the search for human nature "can be viewed as the archaeology of the epigenetic rules." When confronted with adaptive challenges, some brains are equipped with epigenetic rules that enable them to "choose wisely," and brains so equipped "possess superior Darwinian fitness, meaning that statistically they survive longer and leave more offspring than brains that choose badly" (Wilson 1998:165). Some evolutionary sociologists conceptualize epigenetic rules as "behavioral predispositions," which have been analyzed for their possible influence on patterns of social behavior (Lopreato 1984, 2001; Lopreato and Crippen 1999).

Apparently unaware that all phenotypic traits develop by means of gene-environment interaction, some sociologists charge that sociobiology advocates a view of heritable behaviors as "biologically fixed patterns of action" (Applebaum and Chambliss 1997:62) or as "inalterable behavioral complexes" (Doob 1997:123) that make humans "prisoners of their genes" (Henslin 1997:50–51). This is a position that could be taken only by someone unaware of the evolutionary concept of the *norm of reaction*. The principle of the norm of reaction, conspicuously absent from routine sociological discussions of sociobiology, means that environmental factors influence, to a greater or lesser degree, the development of a phenotype during epigenesis. Thus, the characteristics of a phenotype are not attributable to the influence of the genotype alone.

Wilson (1998:137–38) illustrates the way in which environmental variation can alter the expression of a given genotype in his discussion of the arrowleaf plant. An amphibious plant, the arrowleaf has evolved to be able to adjust the shape of its leaf in response to the specific environmental conditions in which it grows. On dry land, "its leaves resemble arrowheads. When it grows in shallow water, the leaves at the surface are shaped like lily pads; and when submerged in deeper water, the leaves develop as eelgrasslike ribbons that sway back and forth in the surrounding current.

No known genetic differences among the plants underlie this extraordinary variation. The three basic types are variations in the expression of the same group of genes caused by different environments" (Wilson 1998:137, emphasis ours). The term used to describe the "total variation in the trait in all survivable environments is the norm of reaction of that gene or group of genes in that species" (Wilson 1998:137). A trait that features a narrow norm of reaction is one that produces only a limited range of phenotypes when subjected to a wide range of environmental variation. Conversely, a trait with a wide norm of reaction manifests a much greater array of phenotypes in response to variable environmental input during development. The idea of the norm of reaction is very important in dispelling the misconception, held by some sociologists (e.g., Bryjak and Soroka 1997; Henslin 1997), that humans display far too much sociocultural diversity to be reduced to a common genome. Similarly, Henslin (1997:51) objects that if humans were "prisoners of their genes . . . we would live in a monoculture of some sort." Were but Henslin's thinking about genetics and human behavior informed by the dual principles of epigenesis and the norm of reaction, he never would have offered such a biologically dubious observation. In the sociobiological view, cultural universals (such as incest prohibitions) develop under the influence of narrow norms of reaction, while cultural diversity (as in marriage and kinship patterns) is to be expected as a product of epigenetic rules that feature wide norms of reaction. The norm of reaction, perhaps more than any other evolutionary concept, could liberate sociologists of their fear—born of ignorance and misunderstanding—that sociobiology promotes a version of genetic determinism that reduces humans to little more than puppets behaving stereotypically at the behest of tyrannical genes dictating inflexible behavior. The persistence of such misrepresentations is particularly puzzling in light of the fact that, for almost two decades, evolutionary sociologists have produced highly informative discussions of topics such as determinism, methodological reductionism, and the "interaction principle" (Lopreato 1984, 2001; Lopreato and Crippen 1999). Perhaps only by studiously avoiding pertinent discussions such as these is it possible to sustain high levels of "biophobia" in sociology.

On occasion, sociologists also accuse sociobiologists of claiming that specific behaviors are always produced by specific genes dictating those behaviors. For example, Popenoe (1995:116) charges that sociobiologists have yet to identify a "gene responsible for any particular aspect of social behavior." This can be described as the "one gene, one behavior" argument, and it closely resembles what Wilson (1998) calls the OGOD, or "one gene, one disease" model of heritable pathologies discussed occasionally in the medical sciences literature. But rather than attributing a single category of behavior to a single gene (allele), Wilson (1998:146) explains that behavior is more likely to be shaped by entire "ensembles of genes" called "polygenes." As Wilson (1998:141) puts it, "there is no gene for playing the piano well, or even a particular 'Rubenstein gene' for playing it extremely well. There is instead a large ensemble of genes whose effects enhance manual dexterity, creativity, emotive expression, focus, attention span, and control of pitch, rhythm, and timbre." When biologists use a form of conversational shorthand and speak of a "gene 'causing' a particular behavior . . . they never mean it literally" (Wilson 1998:137).[3]

[3] While not claiming that one gene "causes" one behavior, Krieger and Ross (2002) report having identified a single, specific gene (Gp-9) that has a "major effect" in the expression of complex social behaviors in *Solenopsis invicta*, the fire ant (2002:328–32). They conclude that selection has produced different alleles responsible for different forms of colony-level social organization in this South American fire ant. And while this finding does not overturn the claim that sociobiologists have failed to isolate a gene responsible for social behavior in humans, it suggests that the discovery of such an allele is not impossible.

THE ADAPTED MIND

Unfamiliar with concepts such as epigenesis and the norm of reaction, it was easy in the mid- to late 1970s for many sociologists to conclude that this new version of "genetic determinism" deserved criticism for circumventing the human mind and misattributing social behaviors to the direct influence of genes. To its critics, sociobiology ignored precisely those features of human life that most SSSM thinkers find undeniably important and most interesting: cognition, symbolism, language, culture, and, perhaps most inexcusably, learning. In its starkest form, the conclusion reached by critics such as Giddens (1996) and Henslin (1997) is that sociology and sociobiology are diametrically opposed systems of explanation that pit "social learning" against "instinct" and that sociobiology not only neglects culture but fails to even consider the role of "the uniquely human mind" in producing social behavior (Hess et al. 1996:23). In response to such criticisms, neo-Darwinians sought to correct the misunderstanding by focusing attention on the evolution of both human cognition and culture, the product of cognition (e.g., Boyd and Richerson 1985; Cavalli-Sforza and Feldman 1981; Durham 1991; Feldman and Cavalli-Sforza 1976; Lopreato 1984; Lumsden and Wilson 1981). In fact, Wilson (1998:150) observes that by the 1990s, research on gene-culture coevolution had begun to displace the study of altruism as the "central problem of sociobiology" as applied to humans. This was to have been expected, because, as Wilson (1998:126) puts it: "*We know that virtually all human behavior is transmitted by culture*. We also know that biology has an important effect on the origin of culture and its transmission. The question remaining is how biology and culture interact, and in particular, how they interact across all societies to create the commonalities of human nature" (emphasis ours). In evolutionary sociology, this issue has been addressed directly and at length in discussions of topics such as the interplay of biology and culture, biocultural evolution, and the "interaction principle" (Lopreato 1984; Lopreato and Crippen 1999), thereby leaving critics with little justification for their persistent misrepresentations.

Prepared Learning

Contrary to the views of critics who thought that sociobiologists either ignored or denied the role of learning in organizing and regulating human social behavior, Lumsden and Wilson (1981:35–98) made the phenomenon of *prepared learning* or *biased learning* (also called *directed learning*) central to the sociobiological research program, and in only a few years this program was given even greater impetus by the development of techniques for the experimental investigation of prepared learning (e.g., Cosmides 1989; Cosmides and Tooby 1989, 1992). In the early part of the 20th century, William McDougall and J. B. Watson debated the relative importance of genetic versus environmental factors in shaping behavior. The environmentalists prevailed until the 1960s, when ethologists established the existence of "mammalian learning biases" (Shaw and Wong 1989:63). During the same period, the idea of prepared learning emerged in psychology to challenge the explanatory dominance of "militant environmentalism" in general and Pavlovian conditioning in particular (Seligman 1993:69–75). The seminal moment in prepared learning theory was the discovery of the single-trial, selective learning of food aversion by laboratory rats (Garcia and Koelling 1966). The researchers subjected rats to a bright light accompanied simultaneously by a loud noise (a compound conditional stimulus) followed by a dose of x-ray radiation (undetectable to the rats) when the rats drank

from a spout that provided saccharin flavored water. The x-rays induced nausea several hours later, and the rats immediately developed an aversion to saccharin but not to the bright light or loud noise. In a follow-up study, other rats were subjected to an experimental design that also exposed them to a bright light and loud noise when they drank the saccharin water, but applied a foot shock instead of x-rays, thereby inducing pain instead of nausea. In this experiment, the rats quickly developed an aversion to the light and noise, but not to the saccharin.

Seligman reports a similar phenomenon, the *sauce béarnaise* aversion, which he experienced personally. Having eaten a filet mignon with *sauce béarnaise* one evening, he became nauseous and violently ill several hours later. Subsequently, he developed a profound aversion to *sauce béarnaise* that he was able to overcome only a quarter-century later. This experience, and his reflections on the laboratory rat experiments that demonstrated a selective and rapidly learned food aversion, led Seligman to conclude that some types of learning, such as many phobias, are the product of evolutionary processes (Rachman and Seligman 1976; Seligman 1971). In the ancestral environments in which they evolved, rats faced threats in the forms of toxins and diseases if they ate contaminated food. If this food made them nauseous but did not kill them, and if it also provided a distinctive cue (taste or smell) that could be remembered and associated with other contaminated food, it would be adaptive to learn quickly and to remember the pairing of the contaminated food cue with the nausea it induced. Natural selection would favor this learning ability, and what now is called single-trial learning is explicable as the result of strong, prepared learning "aptitudes" to stimuli that signal highly salient survival threats or opportunities.

Seligman (1993:71–72) explains that the rats' food aversion (as well as his rapidly acquired and durable aversion to *sauce béarnaise*) is not easily explained by the logic of Pavlovian conditioning. The rats' aversion was selective. They expressed aversion to saccharin but not to light or noise. In Pavlovian theory, an animal should learn an aversion to any conditional stimulus that is paired with an unconditional response. Second, Pavlovian conditioning requires that the conditional stimulus be paired with the unconditional response very quickly. For both the laboratory rats and Seligman's *sauce béarnaise* experiences, however, the unconditional response (nausea) did not appear until hours after exposure to the stimulus. Third, while Pavlovian conditioning requires multiple trials to produce the intended learned behavior, both the rats and Seligman learned their aversions after single-trial experiences. Fourth, the food aversions acquired by both the rats and Seligman were not extinguished as easily as are many behaviors that animals learn by Pavlovian conditioning. Patterns of behavior that natural selection prepares organisms to learn are commonly retained for long periods of time, if not indefinitely.

Guided by the work of researchers such as Garcia and Koelling (1966) and Seligman and Hager (1972), sociobiologists reason that humans are likely to feature "biases" toward learning about phenomena that in the *environment of evolutionary adaptedness* (EEA) (Bowlby 1969) had the greatest bearing on an individual's prospects for survival, personal reproduction, and the reproduction of its close kin. Instead of adopting the assumption that human learning capabilities are equipotent in terms of content (e.g., Skinner 1974), thereby making humans neither more nor less likely to learn about phenomena that are relevant to inclusive fitness,[4] the new evolutionary

[4] Darwinian (or direct) fitness is proportional to the number of replicas of an individual's genes that it passes to subsequent generations by the production of its own offspring. Indirect fitness is proportional to the number of replicas of one's genes transmitted to subsequent generations by contributing to the reproductive success of kin that carry and transmit those replicas. "Inclusive fitness is the sum of direct and indirect fitness" (Cartwright 2000:347, 349). Inclusive fitness is enhanced by "kin selection."

psychologists begin inquiry by assuming that human learning capabilities are biased or are directed toward learning and retaining information that, in the EEA, had the greatest relevance to their ancestors' prospects for maximizing their inclusive fitness (Shaw and Wong 1989:65–89).

Neo-Darwinian researchers such as Shaw and Wong (1989:66) conceptualize the human mind not as "a blank sheet for individual mental and cultural development, but [as] a sheet at least lightly scrawled with tentative outlines that assist survival and reproduction." Or, as Hamilton (2003) expressed it: "The *tabula* of human nature is no longer *rasa*, and it is being read." Among sociobiologists, the "principle of equipotentiality," which is fundamental to behaviorism, has been replaced by the notion of directed learning. They reject the notion that universal learning processes exist in all species and contend, instead, that "there are marked differences between species in tasks that are learned and the ways in which they are learned" (Shaw and Wong 1989:69). As they elaborate, "constraints on learning are most evident in cases where animals consistently fail to learn a task when their performance with other, often more difficult tasks would lead us to expect otherwise. We now know this failure is not a sign of poor learning ability. Rather, learning tends to be *tailored to the animal's needs*. And in this context, it is the animal's niche (environment) that most affects what it learns and the way it learns it. Because niches differ in many respects, so, too, do biases in learning" (Shaw and Wong 1989:69, emphasis ours).

During the early years of sociobiological theorizing and research about the evolution of human learning biases, inquiry focused on classes of behavior such as taste and smell, color classification, hearing, facial recognition, the detection of visual pattern complexity, forms of nonverbal communication, fears and phobias, and elementary forms of social behavior such as mother-infant bonding and incest avoidance (Lumsden and Wilson 1981). In more recent years, these studies of prepared learning have expanded to include inquires into phenomena such as innate biases expressed in a preference for mutual cooperation in social exchange (Kiyonari, Tanida, and Yamagishi 2000), gender differences in preference for "quantity versus quality" of offspring (Borgerhoff Mulder 2000), resource sharing in "windfall" gain situations (Kameda et al. 2002), and gender differences in persecutory delusions (Walston, David, and Charlton 1998). The implications of the idea that humans, like other mammals, may be equipped with learning biases that are the product of natural selection raises the possibility of an entirely new way of theorizing about how biology may influence social behavior. Specifically, it reaffirms the long-standing SSSM emphasis on learning as central to any explanation of human behavior, but it introduces an entirely new way of thinking about ways in which humans may be designed to learn. In a manner that can be reconciled with conventional sociological reasoning, directed learning implies that humans are equipped with an evolved cognitive architecture—that is, a rich array of specialized learning capabilities that represent evolved adaptations to specific, adaptively relevant, archaic, and recurrent structures and processes of social life. Furthermore, these structures and processes themselves function as forces of natural selection. Simply put, humans are hypothesized to possess innate learning competencies that are specialized for solving what can be conceptualized as "Darwinian social problems."

"Cheating" as a Darwinian Social Problem

In his classic essay, "The Norm of Reciprocity," Gouldner (1960) argued that reciprocity is foundational to human societies. A decade later, the evolutionary biologist

Trivers (1971) published a highly influential article on *reciprocal altruism*,[5] which documented the importance of reciprocity, especially delayed reciprocity, in nonhuman societies. In recent years, sociobiology has converged on sociology (and other SSSM sciences such as economics and political science) by employing SSSM concepts and theories to analyze processes of reciprocity and exchange in nonhuman species. Specifically, sociobiologists now make extensive use of game theory in general and the "prisoner's dilemma" model in particular in their analyses of various forms of social interaction, especially cooperation (e.g., Maynard Smith 1982).

As Lopreato observes, "reciprocity or exchange theory . . . are among the oldest and enduring topics in sociocultural science," and although they are highly prevalent in recent sociological journals, rarely do sociologists discuss them in an evolutionary key (2001:418). Nevertheless, the analysis of patterns of reciprocity and exchange by sociobiologists provides an excellent opportunity to explore similarities and differences in the metatheoretical assumptions employed by sociologists and sociobiologists. When conceptualized in terms of the SSSM, exchange and reciprocity are viewed as behaviors acquired solely by social learning and transmitted by culture. With the exception of the general "capacity for culture," most SSSM sociologists are unlikely to interpret any component of social exchange as an expression of innate adaptations that humans acquired by natural selection. For this reason, it is useful to consider recent research on one such putative adaptation pertaining to the exchange process, the detection of "cheating," or the failure to reciprocate in social exchange.

By adopting game-theoretic reasoning, especially the prisoner's dilemma model, neo-Darwinian theorists have been able to frame processes of exchange and reciprocity in a manner amenable to experimentation (Axelrod 1984; Axelrod and Hamilton 1981; Maynard Smith 1982; Trivers 1971). And questions about cheating and cheating detection led Cosmides and Tooby (1992:163–228) to conduct a series of experiments to try to determine if humans possess evolved mental algorithms (specialized cognitive procedures) specifically adapted to social interactions involving exchange and reciprocity. The SSSM model of human nature and behavior implies that humans are not equipped with an evolved adaptation dedicated specifically to detecting cheating in social interaction. Rather, SSSM theorists are likely to contend that the ability to detect cheating (defection, nonreciprocity) in relation to social exchange must develop as the product of experience or be acquired by cultural transmission (socialization), perhaps even formal instruction.

Cosmides and Tooby developed an experimental research protocol designed to adduce evidence, if available, of the existence of an innate cheating detection procedure in the human mind. Toward that end, they adopted a modified version of an experimental instrument known as the "Wason selection task" and used it to conduct experiments about how humans reason about social contracts (Cosmides and Tooby 1992:181–206). By conducting a series of controlled laboratory experiments, Cosmides and Tooby (1992) generated evidence that about 75 percent of their subjects could detect possible violations of social exchange rules better than other rule violations expressed in the same logical form ("If P, then Q") but were devoid of social content. Their results withstood experimental controls for a variety of possible confounding influences and led them to conclude that humans in fact do possess an

[5] An oxymoron, the concept of reciprocal altruism denotes what most social scientists would call delayed reciprocity, or delayed exchange. The behavior initially appears to be altruistic only because the exchange is not simultaneous.

evolved adaptation for cheating detection, an adaptation that appears to be designed to increase people's chances of avoiding the threat of nonreciprocity from those to whom they previously have provided benefits. Furthermore, their work suggests that the cheating detection procedure displays a sufficiently broad norm of reaction so as to enable people to learn the subtleties and nuances of the relations of social exchange unique to their local social worlds. Even though all humans might possess an evolved, universal cognitive algorithm for detecting cheating in situations of social exchange, individual learning and cultural context almost certainly "fine tune" or "calibrate" the cheating detection procedures so as to enable people to navigate the peculiarities of their local sociocultural environments.

How does neo-Darwinian logic account for (indeed, predict) the existence of a cheating detection procedure in humans? It is a virtual truism in evolutionary thinking that all evolved adaptations are solutions to problems of the past. That is, any evolved adaptation that is possessed by an organism today is the product of forces of selection to which its ancestors were exposed in the *environment of evolutionary adaptedness* (EEA). The EEA is a term that refers to adaptation-relevant features of the environments inhabited by ancestral populations (Bowlby 1969; Tooby and Cosmides 1990). Many of the adaptations possessed by humans are viewed by neo-Darwinians as having evolved during the geological epoch known as the Pleistocene. What specific feature of the EEA of human populations could have selected for an adaptation for detecting cheating? The selection force, according to evolutionary theorists, is to be found in the structures and processes of group living, specifically, in social exchange relationships. Adaptations evolve in response to selection forces that function either as opportunities or as threats. Additional experimental work reported by Mealey and her colleagues (1996) indicated that people are better at remembering the faces of cheaters than those of trustworthy people, thereby providing further support of the claim that cheating is a Darwinian threat, a Darwinian "social problem."

Of course, Cosmides and Tooby are not without their critics, such as the philosopher Fodor (2000:55–104), who takes strong exception to their claims that human cognition is "modular" and that the mind is equipped with a vast array of specialized mental adaptations (such as a cheating detection "mechanism") that enable humans to create and to live in complex societies. Nevertheless, research of the sort conducted by Cosmides and Tooby is very useful for understanding metatheoretical similarities and differences between evolutionary-minded social scientists and devotees of SSSM social science.

EVOLUTIONARY SOCIOLOGY EMERGING

As should be clear, only ignorance of evolutionary concepts such as *prepared learning*, *epigenesis*, and the *norm of reaction* can explain the criticisms of sociobiology exhibited in the synopsis presented at the beginning of this article. Contrary to stereotypes held by many sociologists, sociobiology is not built on the foundation of the EGDM, and sociobiologists do not embrace research programs that advocate either reductionism in the absence of synthesis or "rigid genetic determinism" (Wilson 1998:166). To be sure, sociobiologists such as Wilson see in reductionism the "driving impulse of Western natural science" (1998:50) and credit it with producing an "unbroken string of successes" over the past three centuries (1998:30). But Wilson also insists that reductionism must be complemented by synthesis or "holism" in scientific inquiry; otherwise, the scientific quest will fail (1998:66–95).

Catching the first whiff of sociobiology, many sociologists often object, in an almost "instinctual" manner (Ellis 1996), to "reductionism" and "determinism." Van den Berghe contends that the antipathy to evolutionary thinking is a trait that sociologists share with humans in general, but that the intensity of the biophobia expressed by sociologists cannot be attributed entirely to untrained naiveté. Rather, van den Berghe (1990:176–82) argues that sociologists' antipathy to evolution is enhanced by their professional socialization and represents nothing less than a "trained incompetence." And it is training in the SSSM, we contend, that is responsible for much of the incompetence of sociologists about matters pertaining to biology and human behavior. Like van den Berghe, we attribute much of this to the (almost exclusive) environmental determinism, the anti-biological reductionism, and the anti-genetic determinism that generations of sociologists have absorbed from the SSSM. Consequently, as van den Berghe (1990:177) puts it, "many sociologists are not merely oblivious about biology; they are militantly and proudly ignorant. They *know* biology to be irrelevant to their interests, so they are determined not to make the effort to learn about it."

As Wilson (1998:45–95) explains, patiently and at length, the natural sciences triumphed precisely because they employ reductionist logic and search for causal relations (i.e., are "deterministic"), all the while realizing that empirical reality exhibits staggering complexity that defies simplistic forms of biological reductionism and rigid versions of genetic determinism. It is to the logic of reductionism and determinism, in fact, that sociobiology owes its guiding explanatory "law," known commonly as the *maximization principle*, or the *fitness principle*, which states that "organisms tend to behave in ways that maximize their inclusive fitness" (Lopreato and Crippen 1999:77). The maximization principle derives from Hamilton's pioneering work (1964) on the genetic foundations of social behavior among the eusocial insects, a scientific breakthrough made possible only by reductionistic thinking. In light of the importance of reductionism and determinism in leading to this breakthrough, it is understandable perhaps that the evolutionary sociologists Lopreato and Crippen (1999:96) write, in a tone of obvious exasperation, that "there are *two* (emphasis ours) fundamental orders of causes in evolution, and in behavior: one is genetic in nature; the other is environmental, and it includes the cultural. It follows that all talk of 'biological determinism,' which verges on the epidemic among sociologists, is sheer poppycock and reveals an intellectual lacuna that with the years has become a huge impediment to cross-disciplinary fertilization."

No less annoying to neo-Darwinians is the assumption by many sociologists that sociobiologists unilaterally fail to realize that social systems exhibit emergent properties that must be acknowledged in order to explain animal social behavior. In fact, for over 20 years, behavioral biologists have been using game theory in order to make the emergent properties of animal populations, societies, and patterns of social interaction tractable to evolutionary analysis (e.g., Maynard Smith 1982). Realizing that the behavior of animals cannot be reduced entirely to individual traits alone, behavioral biologists increasingly use game theory to explain how social contexts constrain and enable the behavior of individuals. In fact, adopting a form of analysis that is distinctively "sociological," evolutionary game theorists analyze how the "strategy context" within which an animal behaves will enhance or will suppress the probability that it will adopt one rather than another behavioral strategy in activities such as foraging, mate selection, or reproduction. Thus, it can be said that sociobiologists studying nonhuman species have devoted themselves for almost three decades to the *sociological* study of emergent properties of animal societies (Machalek 1999). In fact, Wilson insists that even the behavior of ants cannot be understood without taking

into account that an ant colony features emergent properties that must be analyzed "holistically" (Hölldobler and Wilson 1990; Wilson 1998).

Convergence of Sociology and Sociobiology

Despite the beliefs of many sociologists, such as the textbook authors discussed herein, there are numerous points of metatheoretical convergence between sociology and sociobiology. It is, perhaps, only because so few sociologists have become informed sufficiently about neo-Darwinism in general and sociobiology in particular that many have failed to recognize this convergence. Examples of metatheoretical convergence between sociology and sociobiology include assumptions such as the following:

1. *The dominant force organizing and regulating human social behavior is culture*. Like sociologists, Wilson (1998:126) contends that "virtually all human behavior is transmitted by culture." Like sociologists, sociobiologists attribute human social behavior to the proximate causal influence of cultural forces. Unlike most sociologists, sociobiologists seek to understand how biology and culture interact. The topic of "gene-culture" coevolution has been identified in sociobiology as "the central problem of the social sciences and humanities, and simultaneously one of the great remaining problems of the natural sciences" (Wilson 1998:26).
2. *Symbolic language is unique to humans, and it is the generative force of culture*. Like sociologists, sociobiologists identify humans as unique by virtue of their linguistic powers: "Culture is constructed with language that is productive, comprising arbitrary words and symbols invented purely to convey information. In this respect *Homo sapiens* is unique. Animals have communication systems that are sometimes impressively sophisticated, but they neither invent them nor teach them to others . . . Bonobos and other great apes possess high levels of intelligence by animal standards but lack the singular human capacity to invent rather than merely use symbolic language" (Wilson 1998:131–32).
3. *Humans rely on learning, especially social learning, to acquire and to express patterns of behavior*. Despite the misunderstanding of some sociologists who believe that sociobiologists ignore learning in humans and attribute human behavior to instinct, we have seen that neo-Darwinians interpret learning itself as an instinct (e.g., Daly and Wilson 1988). There is no disagreement between sociologists and sociobiologists in terms of the importance each attaches to learning, but there is disagreement about the nature of the learning process.
4. *Human behavior is highly malleable and is subject to modification by experience and environmental influence*. Both sociologists and sociobiologists marvel at the extraordinary adaptability of human behavior. Most human social behaviors are likely to exhibit a broad norm of reaction. It is neither trivial nor tautological to avow, as do sociobiologists, that human adaptability itself is an extraordinary adaptation.
5. *Social behavior is not determined directly by genes but, rather, by complex interactions between the individual and the environments (both physical and sociocultural) that he or she inhabits*. Sociobiologists, informed by a scientific understanding of epigenesis, never contend that genes directly determine behaviors. Rather, like sociologists, they understand social behavior as the product of the activity of the brain, which is informed and is shaped by innumerable influences of those environments, both physical and sociocultural, in which individuals live and act.

6. *Humans generate, acquire, store, retrieve, and transmit symbolically encoded meanings in terms of which they orient their behaviors, including their social behavior*. Like sociologists, sociobiologists acknowledge that the human experience of the empirical world is mediated by cognitive activity. Humans are meaning-constructing, meaning-bearing, and meaning-transmitting organisms. The role of human cognition in producing and in regulating social life is of no less interest and concern to neo-Darwinian scholars and scientists than it is to sociologists.
7. *To that extent that biology influences patterns of human social behavior, those patterns are not "fixed and inalterable."* Like sociologists, sociobiologists note that the extraordinary architecture of the human brain, comprising 100 billion neurons interconnected by their axons, gives humans a profound capacity for behavioral flexibility. And in the view of many neo-Darwinian researchers, a great deal of that flexibility appears to have evolved less so as to enable humans to cope successfully with variation in their physical environments and more so as to enable them to cope with the complexity and dynamism of human social worlds (which, themselves, are products of the powerful brains that produce them).
8. *Societies are complex systems, the emergent properties of which cannot be explained completely in terms of the components that generate them*. As discussed earlier, sociobiologists view societies, human and nonhuman, as complex adaptive systems. And as with other types of complex adaptive systems (such as organs, bodies, and ecosystems), societies exhibit the property of emergence, thereby requiring holistic explanatory effort. Patterns of social behavior in both human and nonhuman species are rarely, if ever, reducible entirely to the traits of individuals that constitute the populations of the groups and societies in which they live.

Taken together, these eight metatheoretical assumptions shared by both sociologists and sociobiologists make it clear that many of the attributions sociologists have made about sociobiology are simply false. If sociobiology were built upon the metatheoretical assumptions featured in the EGDM, then an insurmountable intellectual gulf would in fact separate sociobiology and sociology. But that is not the case. Rather, the fact that sociology and sociobiology share at least these eight metatheoretical assumptions suggests the possibility for a greater degree of integration, if not what Wilson (1998) calls "consilience," between these two disciplines.

Divergence of Sociology and Sociobiology

To say, however, that sociology and sociobiology share in common several critical metatheoretical assumptions is not to deny significant points of divergence between them. The degree to which theoretical integration between sociology and sociobiology is likely to occur will be limited by the metatheoretical divergence that separates them. Among those divergent assumptions are the following:

1. *Assumptions about the nature of human learning*. Under the long-standing influence of the *tabula rasa* assumption and the belief, nurtured and formalized by behaviorism in psychology, that the human brain enables equipotentiality in learning, sociologists are less likely to be receptive to the concept of prepared (biased, or directed) learning than are sociobiologists. Instead, sociologists are more likely to subscribe to a view of the human brain as capable of processing equally well any information that is accessible to the human sensory system and

of executing any behaviors that are prescribed culturally. Similarly, sociologists may be unlikely to entertain the hypothesis that humans are equipped with evolved adaptations (cognitive algorithms) dedicated to the preferential learning and retention of patterns of behavior that were adaptive in the EEA. The strong emphasis on social learning and cultural transmission in sociology and the SSSM view of the human brain as a global, all-purpose learning machine causes resistance to the idea that humans possess specialized learning biases that have evolved in response to the selection forces posed by group living.

2. *Assumptions about the existence of human "instincts."* As noted earlier, sociologists long have eschewed instinct-based explanations of human behavior, especially social behavior. In large part, the term *instinct* has been interpreted by SSSM thinkers to mean behaviors that are highly prescribed, rigidly fixed, impervious to either biographical or environmental variation, and "directly determined" by a specific gene dedicated to the production of that behavior. Sociologists have objected frequently, and correctly, to the kind of thinking that can lead to a search for "one gene each for every social behavior." Sociobiologists, on the other hand, operate on the premise that much of human behavior may be subject to the guiding influence of instincts, including the possibility that humans possess "social instincts," such as the cheating detection procedure or Pinker's (1994) "language instinct."

3. *Assumptions about human genetic variation and sociocultural heterogeneity*. Recent research on the human genome supports the view that all human populations share a common genome, which in turn explains why these populations feature more within-group than between-group genetic variation. Coupled with the fact that social and behavioral scientists have documented extraordinary variation within and across human societies, few sociologists believe that human social behavior could be subject to any significant genetic influences. While readily accepting the fact that humans share a common genome, sociobiologists reject the position that the existence of sociocultural variation itself constitutes *prima facie* evidence of the disconnection between genes and social behavior. And unless SSSM social theorists and researchers become familiar with the principle of the norm of reaction, it is unlikely that the thinking of sociologists and sociobiologists will converge on this issue.

4. *Assumptions about the flexibility of behaviors putatively subject to biological influence*. Because of the dominance of what Dennett (2003) calls "the mythical threat of genetic determinism," it is difficult for many sociologists whose thinking is dominated by the SSSM to reconcile the unambiguous fact that human social behavior is extremely malleable with the idea that human social behaviors also may be shaped by epigenetic rules, described variously as evolved *cognitive algorithms* or *behavioral predispositions*. For many SSSM thinkers, conceding the existence of an influential biological substrate for human society and social behavior is irreconcilably at odds with the self-evident flexibility of human behavior at all levels of expression, ranging from the individual to the world-system. By way of contrast, neo-Darwinians routinely assume that evolved behavioral adaptations, including adaptations for social behavior, feature degrees of flexibility probably designed to maximize the fitness-enhancing value of the adaptation in variable environments.

5. *Assumptions about the respective efficacy of biology and culture as causes of human social behavior*. One of the most obdurate effects of SSSM on sociological thought has been to persuade many sociologists that "biology" and "culture" are mutually exclusive principles for causal explanations of human behavior. Given

the way in which many sociologists who subscribe to the SSSM view biological explanations, it is hardly surprising that they might see biological and cultural explanations as incompatible if not irreconcilably at odds with each other. And although many sociologists acknowledge that biology is not irrelevant to explanations of human social behavior, most concede little more causal efficacy to biology than the platitude that the brain endows humans with the "capacity for culture." In contrast, sociobiologists have placed the topic of gene-culture coevolution and the exploration of evolved cognitive adaptations at the center of their programs of social research.

6. *Assumptions about laws governing social behavior*. The maximization principle is the *sine qua non* of sociobiological theory, and it provides sociobiology with a comprehensiveness and unity of explanatory focus unlike anything in SSSM sociology. For sociologists averse to the idea of a scientific sociology, the reductionism and determinism implicit in the maximization principle may be more than sufficient cause to shun sociobiological reasoning. For sociobiologists, however, the law-like nature of the maximization principle is the key not only to the explanatory promise inherent in sociobiological reasoning, but it also is the guiding principle to be credited for the successes of a century and a half of evolutionary biology.

CONCLUSION

Western sociology took root during the early years of the first Darwinian revolution, and a significant portion of early sociological thought was framed in terms of Darwin's theory of evolution by natural selection (Lopreato and Crippen 1999:3–80; Turner 2001:9–10; van den Berghe 1990:177). By the mid-20th century, however, the eugenics and racism of Social Darwinism and the "environmentalism" advocated by Franz Boas, Ruth Benedict, and Margaret Mead had effectively expunged most evolutionary thinking from the modern social sciences, including sociology (Cartwright 2000:20–24; Wilson 1998:181–85).

The publication of *Sociobiology: The New Synthesis* in 1975 helped create an opportunity for a number of scholars (e.g., Chase 1980; Lopreato 1984; van den Berghe 1981; Wallace 1983) to revive evolutionary analysis in sociology. Sociologists such as Lopreato and Crippen (1999) contend that the rise of sociobiology is fortuitous, because they see it as a solution to the current crisis of fragmentation, dissociation, and the failure of scientific nerve that now plague sociology. Even more recently, Massey (2002) and Turner (2000) have argued the value of adopting an evolutionary perspective to explain human sociability, especially in terms of its foundations in human emotional life. Today, evolutionary sociology continues to grow, counting among its ranks sociologists such as Christopher Badcock, Timothy Crippen, Lee Ellis, Lee Freese, Satoshi Kanazawa, Alexandra Maryanski, Patrick Nolan, Stephen Sanderson, and Richard Udry, among others. Indicating a departure from the "environmentalism" that has dominated sociology for most of the 20th century, scholars such as Massey (2000:700) observe that "sociologists have gone too far in privileging the social over the biological." Departing even farther from SSSM orthodoxy, Massey (2000:201) goes on to recommend that sociologists need "to give up our historical resistance to the idea that social behavior has biological roots and accept the fact that we, as human beings, have inherited certain predispositions to thought and

behavior that influence and constrain the social structures that we unconsciously evolve and rationally select."

Because the second Darwinian revolution has recruited to its ranks more anthropologists and psychologists than sociologists, evolutionary sociologists such as Lopreato (2001) and Ellis (1996) voice concern that sociology's very survival may be imperiled if it permits the other social and behavioral sciences to seize control of the emerging evolutionary social sciences. At the same time, Lopreato and Crippen caution neo-Darwinian social and behavioral scientists against becoming embroiled in a "quarrel over turf" among themselves, a quarrel that could arrest progress in human sociobiology. Instead, Lopreato and Crippen (1999:130) endorse as "felicitously conceived" Paul Turk's injunction that all neo-Darwinians should avoid internecine squabbles and "just do it!"

In order to "just do" evolutionary sociology, it will be necessary for sociologists to become more fully aware of the metatheoretical assumptions they have inherited from the SSSM and to be willing to reconsider each assumption in light of new information available in behavioral biology, especially evolutionary biology. Currently, significant barriers appear to inhibit the free flow of information from evolutionary biology into sociology. Consider, for example, the assertion by the textbook authors Applebaum and Chambliss (1997:62–63) that cultural variation in standards of human beauty illustrates the absence of genetic determinants of human aesthetic preference. Like many sociologists, Applebaum and Chambliss avow that conceptions of beauty are determined strictly culturally. Whatever one's conclusions about this issue, it is significant that their discussion of beauty failed to even mention the existence of a substantial and rapidly growing body of empirical sociobiological research pertaining to genetic influences on human perceptions of beauty. The central focus of this research addresses what biologists call "fluctuating asymmetry," which pertains to how the degree of bilateral symmetry evident in an individual's phenotype functions as a cue that influences perceptions of attractiveness, regardless of the cultural location of the observer (Langlois and Roggman 1990; Gangestad, Thornhill, and Yeo 1994). Similarly, Buss (1999:140–44) cites numerous studies that provide evidence of the existence of markers of physical beauty that do not vary across cultures.

Our purpose here is not to try to adjudicate between these competing claims about the influence of "biology versus culture" on people's perceptions of beauty. Instead, we seek merely to establish that the very existence of declarations that culture—not biology—determines human aesthetic preference ignores a growing body of empirical evidence being generated by second Darwinian "revolutionaries." However, recent signs suggest that more sociologists are beginning to take seriously and to come to grips with sociobiology. For example, Maryanski (1998) concludes that a nascent school of new "evolutionary sociologists" has emerged, and Nielsen (1994) contends that sociobiology is likely to affect future developments in sociology on topics such as sex and gender, collective action, and conceptions of human nature. Still other sociologists, such as Lopreato and Crippen, offer detailed analyses of the value of sociobiology in analyzing topics of traditional sociological interest, such as sex and gender, social stratification, and ethnicity (1999). And Turner (2003), monitoring recent developments in sociological theory, identifies the emergence of several strands of "new evolutionary theories." This sort of evidence alludes to a developing interest among a growing number of sociologists in exploring the extent to which recent advances in sociobiology, behavioral ecology, and evolutionary psychology might nourish new theoretical developments and innovative lines of research in sociology.

Those who advocate developing closer ties between sociology and evolutionary biology point to entirely new types of research possibilities awaiting those who venture into the new field of evolutionary sociology. Consider, for example, the work of theorists and researchers who hypothesize that natural selection may have equipped humans with an evolved psychological "architecture" shaped, over evolutionary time, by social structures and processes acting as selection forces (e.g., Frank 1988; Trivers 1971; Turner 2000). This line of thought invites sociologists to embark on an entirely new type of inquiry to identify the specific structures and processes of small-group life that could have acted as selection forces leading to specialized features in the human mind designed specifically for group living. Detecting "cheaters," for example, is but one adaptive challenge that social living posed to ancestral humans in the EEA. In the future, evolutionary psychologists and other neo-Darwinian researchers will have to turn to evolutionary sociologists, we believe, in order to identify the full complement of Darwinian social threats and opportunities that comprised the social worlds of the human EEA. And it will be those scholars and scientists possessed of the sociological imagination, augmented by a working knowledge of 21st-century evolutionary biology, who will be able to provide such assistance.

REFERENCES

Alcock, J. 2001. *The Triumph of Sociobiology*. Oxford, UK: Oxford University Press.

Alexander, R. D. 1979. *Darwinism and Human Affairs*. Seattle, WA: University of Washington Press.

Avise, J. C. 1998. *The Genetic Gods: Evolution and Belief in Human Affairs*. Cambridge, MA: Harvard University Press.

Axelrod, R. 1984. *The Evolution of Cooperation*. New York: Basic Books.

Axelrod, R., and W. D. Hamilton. 1981. "The Evolution of Cooperation." *Science* 211:379–403.

Barash, D. P. 1982. *Sociobiology and Behavior*, rev. ed. New York: Elsevier.

Borgerhoff Mulder, M. 2000. "Optimizing Offspring: The Quantity–Quality Tradeoff in Agropastoral Kipsigis." *Evolution and Human Behavior* 21:391–410.

Bowlby, J. 1969. *Attachment and Loss. Volume I: Attachment*. New York: Basic.

Boyd, R., and P. J. Richerson. 1985. *Culture and the Evolutionary Process*. Chicago, IL: Chicago University Press.

Buss, D. M. 1999. *Evolutionary Psychology: The New Science of the Mind*. Boston, MA: Allyn and Bacon.

Cartwright, J. 2000. *Evolution and Human Behavior: Darwinian Perspectives on Human Nature*. Cambridge, MA: MIT Press.

Cavalli-Sforza, L. L., and M. W. Feldman. 1981. *Cultural Transmission and Evolution*. Princeton, NJ: Princeton University Press.

Chase, I. I. 1980. "Social Process and Hierarchy Formation in Small Groups: A Comparative Perspective." *American Sociological Review* 45:905–24.

Cosmides, L. 1989. "The Logic of Social Exchange: Has Natural Selection Shaped How Humans Reason? Studies with the Wason Selection Task." *Cognition* 31:187–276.

Cosmides, L., and J. Tooby. 1989. "Evolutionary Psychology and the Generation of Culture. Part II: A Computational Theory of Social Exchange." *Ethology and Sociobiology* 10:51–97.

———. 1992. "Cognitive Adaptations for Social Exchange." Pp. 163–228 in *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*, ed. J. H. Barkow, L. Cosmides, and J. Tooby. New York: Oxford University Press.

Daly, M., and M. Wilson. 1988. *Homicide*. Hawthorne, NY: Aldine De Gruyter.

Dawkins, R. 1989. *The Selfish Gene*. New York: Oxford University Press.

Dennett, D. C. 2003. "The Mythical Threat of Genetic Determinism." *Chronicle Review. Section 2, Chronicle of Higher Education* 49:B7–B9.

Dugatkin, L. A., ed. 2001. *Model Systems in Behavioral Ecology: Integrating Conceptual, Theoretical, and Empirical Approaches*. Princeton, NJ: Princeton University Press.

Durham, W. H. 1991. *Coevolution: Genes, Culture and Human Diversity*. Stanford, CA: Stanford University Press.

Ellis, L. 1977. "The Decline and Fall of Sociology, 1977–2000." *American Sociologist* 12:56–66.
———. 1996. "A Discipline in Peril: Sociology's Future Hinges on Curing Its Biophobia." *American Sociologist* 27:21–41.
Feldman, M. W., and L. L. Cavalli-Sforza. 1976. "Cultural and Biological Evolutionary Processes, Selection for a Trait under Complex Transmission." *Theoretical Population Biology* 9:238–59.
Fodor, J. 2000. *The Mind Doesn't Work That Way: The Scope and Limits of Computational Psychology*. Cambridge, MA: MIT Press.
Frank, R. H. 1988. *Passions Within Reason: The Strategic Role of Emotions*. New York: Norton.
Gangestad, S. W., R. Thornhill, and R. A. Yeo. 1994. "Facial Attractiveness, Developmental Stability, and Fluctuating Asymmetry." *Ethology and Sociobiology* 15:73–85.
Garcia, J., and R. Koelling. 1966. "Relation of Cue to Consequence in Avoidance Learning." *Psychonomic Science* 4:123–24.
Gouldner, A. W. 1960. "The Norm of Reciprocity." *American Sociological Review* 25:161–78.
Hamilton, W. D. 1964. "The Genetical Evolution of Social Behavior, I and II." *Journal of Theoretical Biology* 7:1–52.
———. 1996. *Narrow Roads of Gene Land: Volume I, Evolution of Social Behavior*. New York: W. H. Freeman.
———. 2003. "Human Behavior and Evolution." http://www.HBES.com. Accessed January 22, 2003.
Hölldobler, B., and E. O. Wilson. 1990. *The Ants*. Cambridge, MA: Belknap/Harvard.
Kameda, T., M. Takezawa, R. S. Tindale, and C. M. Smith. 2002. "Social Sharing and Risk Reduction: Exploring a Computational Algorithm for the Psychology of Windfall Gains." *Evolution and Human Behavior* 23:11–33.
Kiyonari, T., S. Tanida, and T. Yamagishi. 2000. "Social Exchange and Reciprocity: Confusion or a Heuristic?" *Evolution and Human Behavior* 21:411–27.
Krebs, J. R., and N. B. Davies, eds. 1997. *Behavioral Ecology: An Evolutionary Perspective*. London, UK: Blackwell Science.
Krieger, M. J. B., and K. G. Ross. 2002. "Identification of a Major Gene Regulating Complex Social Behavior." *Science* 295:328–32.
Kuper, A. 1994. *The Chosen Primate: Human Nature and Cultural Diversity*. Cambridge, MA: Harvard University Press.
Langlois, J. H., and L. A. Roggman. 1990. "Attractive Faces are Only Average." *Psychological Science* 1:115–21.
Lopreato, J. 1981. "Toward a Theory of Genuine Altruism in *Homo sapiens*." *Ethology and Sociobiology* 2:113–26.
———. 1984. *Human Nature and Biocultural Evolution*. Winchester, MA: Allen and Unwin.
———. 2001. "Sociobiological Theorizing: Evolutionary Sociology." Pp. 405–33 in *Handbook of Sociological Theory*, ed. J. H. Turner. New York: Kluwer Academic/Plenum Publishers.
Lopreato, J., and T. Crippen. 1999. *Crisis in Sociology: The Need for Darwin*. London, UK: Transaction.
Lumsden, C. J., and E. O. Wilson. 1981. *Genes, Mind and Culture: The Coevolutionary Process*. Cambridge, MA: Harvard University Press.
Machalek, R. 1999. "Elementary Social Facts: Emergence in Nonhuman Societies." *Advances in Human Ecology* 8:33–64.
Maryanski, A. 1998. "Evolutionary Sociology." *Advances in Human Ecology* 7:1–56.
Massey, D. S. 2000. "What I Don't Know about My Field But Wish I Did." *Annual Review of Sociology* 26:699–701.
———. 2002. "A Brief History of Human Society: The Origin and Role of Emotion in Social Life." *American Sociological Review* 67:1–29.
Maynard Smith, J. 1982. *Evolution and the Theory of Games*. Cambridge, UK: Cambridge University Press.
Mayr, E. 1982. *The Growth of Biological Thought: Diversity, Evolution, and Inheritance*. Cambridge, MA: Belknap/Harvard.
Mealey, L., C. Daood, and M. Krage. 1996. "Enhanced Memory for Faces of Cheaters." *Ethology and Sociobiology* 17:119–28.
Nielsen, F. 1994. "Sociobiology and Sociology." *Annual Review of Sociology* 20:267–303.
Palmer, J. A., and L. K. Palmer. 2002. *Evolutionary Psychology: The Ultimate Origins of Human Behavior*. Boston, MA: Allyn and Bacon.
Pinker, S. 1994. *The Language Instinct*. New York: HarperPerennial.
Rachman, S. J., and M. P. Seligman. 1976. "Unprepared Phobias: Be Prepared." *Behaviour Research and Therapy* 14:333–38.
Ridley, M. 1999. *Genome: The Autobiography of a Species in 23 Chapters*. New York: Perennial.

Segerstråle, U. 2000. *Defenders of the Truth: The Battle for Science in the Sociobiology Debate and Beyond*. Oxford, UK: Oxford University Press.
Seligman, M. E. P. 1971. "Preparedness and Phobias." *Behavior Therapy* 2:307–20.
———. 1993. *What You Can Change and What You Can't*. New York: Fawcett Columbine.
Seligman, M. E. P., and J. L. Hager. 1972. *Biological Boundaries of Learning*. New York: Meredith.
Shaw, R. P., and Y. Wong. 1989. *Genetic Seeds of Warfare: Evolution, Nationalism, and Patriotism*. Boston, MA: Unwin Hyman.
Skinner, B. F. 1974. *About Behaviorism*. London, UK: Jonathan Cape.
Symons, D. 1989. "A Critique of Darwinian Anthropology." *Ethology and Sociobiology* 10:131–44.
Tooby, J., and L. Cosmides. 1989. "Evolutionary Psychology and the Generation of Culture, Part I." *Ethology and Sociobiology* 10:29–49.
———. 1990. "The Past Explains the Present: Emotional Adaptations and the Structure of Ancestral Environments." *Ethology and Sociobiology* 11:375–424.
———. 1992. "The Psychological Foundations of Culture." Pp. 19–136 in *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*, ed. J. H. Barkow, L. Cosmides, and J. Tooby. New York: Oxford University Press.
Trivers, R. L. 1971. "The Evolution of Reciprocal Altruism." *Quarterly Review of Biology* 46:35–57.
———. 1985. *Social Evolution*. Menlo Park, CA: Benjamin/Cummings.
Turner, J. H. 2000. *On the Origins of Human Emotions: A Sociological Inquiry into the Evolution of Human Affect*. Stanford, CA: Stanford University Press.
———, ed. 2001. *Handbook of Sociological Theory*. New York: Kluwer Academic/Plenum Publishers.
———. 2003. *The Structure of Sociological Theory*, 7th ed. Belmont, CA: Wadsworth/Thomson Learning.
van den Berghe, P. 1974. "Bringing Beasts Back In: Toward a Biosocial Theory of Aggression." *American Sociological Review* 39:777–88.
———. 1981. *The Ethnic Phenomenon*. New York: Elsevier.
———. 1990. "Why Most Sociologists Don't (and Won't) Think Evolutionarily." *Sociological Forum* 5:173–85.
Van den Berghe, P., and D. Barash. 1977. "Inclusive Fitness and Family Structure." *American Anthropologist* 79:809–23.
Wallace, W. L. 1983. *Principles of Scientific Sociology*. Hawthorne, NY: Aldine de Gruyter.
Walston, F., A. S. David, and B. G. Charlton. 1998. " Sex Differences in the Content of Persecutory Delusions: A Reflection of Hostile Threats in the Ancestral Environment?" *Evolution and Human Behavior* 19:257–60.
Williams, G. C. 1966. *Adaptation and Natural Selection*. Princeton, NJ: Princeton University Press.
Wills, C. 1989. *The Wisdom of the Gene: New Pathways in Evolution*. New York: Basic Books.
Wilson, E. O. 1975. *Sociobiology: The New Synthesis*. Cambridge, MA: Belknap/Harvard.
———. 1998. *Consilience: The Unity of Knowledge*. New York: Alfred A. Knopf.
Wright, R. 1994. *The Moral Animal: The New Science of Evolutionary Psychology*. New York: Pantheon.

APPENDIX

National Top Selling Titles of Introductory Sociology Textbooks in the United States, Spring/Summer 1997; Source: National Textbook Data Project, National Associates of College Bookstores

*Applebaum, R. P., and W. J. Chambliss. 1997. *Sociology*. New York: Longman.
*Bryjak, G. J., and M. P. Soroka. 1997. *Sociology: Cultural Diversity in a Changing World*. Boston, MA: Allyn and Bacon.
Calhoun, C., D. Light, and S. Keller. 1997. *Sociology*. New York: McGraw-Hill.
*Doob, C. B. 1997. *Sociology: An Introduction*. New York: Harcourt.
Ferrante, J. 1995. *Sociology: A Global Perspective*. New York: Wadsworth.
Gelles, R. J., and A. Levine. 1995. *Sociology: An Introduction*. New York: McGraw-Hill.
*Giddens, A. 1996. *Introduction to Sociology*. New York: W.W. Norton.
*Henslin, J. M. 1997. *Sociology: A Down-to-Earth Approach*. Boston, MA: Allyn and Bacon.

*Hess, B. B., E. W. Markson, and P. J. Stein. 1996. *Sociology*. Boston, MA: Allyn and Bacon.
*Kendall, D. 1996. *Sociology in Our Times*. New York: Wadsworth.
*Kornblum, W. 1997. *Sociology in a Changing World*. New York: Harcourt.
*Landis, J. R. 1998. *Sociology: Concepts and Characteristics*. Boston, MA: Wadsworth.
*Macionis, J. J. 1997. *Sociology*. Upper Saddle River, NJ: Prentice Hall.
*Popenoe, D. 1995. *Sociology*. Englewood Cliffs, NJ: Prentice Hall.
Robertson, I. 1989. *Sociology: A Brief Introduction*. New York: Worth.
*Schaefer, R. T., and R. T. Lamm. 1997. *Sociology: A Brief Introduction*. New York: McGraw-Hill.
Stark, R. 1996. *Sociology*. Boston, MA: Wadsworth.
*Thio, A. 1997. *Sociology: A Brief Introduction*. New York: Longman.
*Tischler, H. L. 1996. *Introduction to Sociology*. New York: Harcourt.
Vander Zanden, J. W. 1996. *Sociology: The Core*. New York: McGraw-Hill.

*Texts containing discussions of sociobiology.